

CLAIMS

- 1 1. A data storage system, comprising:  
2 a first tray having a first end and a second end, a first  
3 sidewall and a second sidewall extending between  
4 the first end and the second end and opposite to  
5 each other, and a surface between the first  
6 sidewall and the second sidewall; and  
7 a first storage device mounted on said first tray between  
8 the first sidewall and the second sidewall and  
9 having a major surface in proximity to the surface  
10 of said first tray, said first storage device and  
11 said first tray forming a first air channel there  
12 between.
- 13 2. The data storage system of claim 1, wherein said first  
14 storage device includes a hard disk drive.
- 15 3. The data storage system of claim 1, further comprising a  
16 chassis having a first opening, wherein said first tray  
17 is mounted in the first opening of said chassis.
- 18 4. The data storage system of claim 3, wherein said first  
19 tray is removably mounted in the first opening of said  
20 chassis.
- 21 5. The data storage system of claim 3, further comprising an  
22 airflow generator mounted on said chassis adjacent the  
23 second end of said first tray in the first opening, said  
24 airflow generator generating an airflow in the first air  
25 channel.

- 26 6. The data storage system of claim 3, further comprising a  
27 second storage device mounted on said first tray and  
28 substantially coplanar with said first storage device,  
29 said second storage device being between said first  
30 storage device and the second end of said first tray.
- 31 7. The data storage system of claim 6, further comprising a  
32 third storage device mounted on said first tray, said  
33 third storage device being between said second storage  
34 device and the second end of said first tray.
- 35 8. The data storage system of claim 7, wherein said chassis  
36 further has a second, a third, and a fourth openings  
37 substantially parallel to the first opening, said data  
38 storage system further comprising:  
39 a second, a third, and a fourth trays mounted in the  
40 second, third, and fourth openings, respectively,  
41 of said chassis;  
42 a fourth, a fifth, and a sixth storage devices mounted on  
43 said second tray and defining a second air channel  
44 there between;  
45 a seventh, an eighth, and a ninth storage devices mounted  
46 on said third tray and defining a third air channel  
47 there between; and  
48 a tenth, an eleventh, and a twelfth storage devices  
49 mounted on said fourth tray and defining a fourth  
50 air channel there between.  
51

51 9. The data storage system of claim 8, further comprising:  
52 data accessing circuitry, said data accessing circuitry  
53 writing data into and reading data from said first,  
54 second, third, fourth, fifth, sixth, seventh,  
55 eighth, ninth, tenth, eleventh, and twelfth storage  
56 devices;  
57 signal processing circuitry coupled to said data  
58 accessing circuitry, said signal processing  
59 circuitry processing data written to and data read  
60 from said first, second, third, fourth, fifth,  
61 sixth, seventh, eighth, ninth, tenth, eleventh, and  
62 twelfth storage devices;  
63 power supply circuitry coupled to said first, second,  
64 third, fourth, fifth, sixth, seventh, eighth, ninth,  
65 tenth, eleventh, and twelfth storage devices and  
66 mounted on said chassis; and  
67 a suction fan mounted on said chassis, adjacent the  
68 second ends of said first, second, third, and  
69 fourth trays in the corresponding first, second,  
70 third, and fourth opening in said chassis, said  
71 suction fan generating airflows through the first,  
72 second, third, and fourth air channels.  
73

- 73 10. The data storage system of claim 8, wherein said chassis  
74 further has a fifth, a sixth, a seventh, and an eighth  
75 openings substantially parallel and coplanar with each  
76 other, and overlying the first, second, third, and fourth  
77 openings, respectively, said data storage system further  
78 comprising:  
79 a fifth, a sixth, a seventh, and an eighth, trays mounted  
80 in the fifth, sixth, seventh, and eighth openings,  
81 respectively, of said chassis;  
82 a thirteenth, a fourteenth, and a fifteenth storage  
83 devices mounted on said fifth tray;  
84 a sixteenth, a seventeenth, and an eighteenth storage  
85 devices mounted on said sixth tray;  
86 a nineteenth, a twentieth, and a twenty-first storage  
87 devices mounted on said seventh tray; and  
88 a twenty-second, a twenty-third, and a twenty-fourth  
89 storage devices mounted on said eighth tray.
- 90 11. A data storage system, comprising:  
91 a plurality of trays, each having a first end and a  
92 second end;  
93 a plural sets of storage devices, each set including a  
94 plurality of storage devices mounted between the  
95 first end and the second end of a corresponding  
96 tray of said plurality of trays and forming an air  
97 channel with the corresponding tray; and  
98 a plurality of data transmission lines coupled to said  
99 plural sets of storage devices.

100 12. The data storage system of claim 11, further comprising a  
101 chassis having a plurality of slots substantially  
102 parallel to each other, wherein said plurality of trays  
103 removably slide into the plurality of slots in said  
104 chassis.

105 13. The data storage system of claim 12, further comprising  
106 an airflow generator mounted on said chassis, said  
107 airflow generator generating an airflow in the air  
108 channel in each of said plurality of trays.

109 14. The data storage system of claim 12, further comprising:  
110 a data accessing circuit coupled to said plural sets of  
111 storage devices and mounted on said chassis, said  
112 data access circuit being capable of simultaneously  
113 accessing data in multiple storage devices in said  
114 plural sets of storage devices; and  
115 a power supply circuit coupled to said plural sets of  
116 storage devices and mounted on said chassis.

117 15. The data storage system of claim 11, wherein:  
118 said plurality of trays include four trays;  
119 said plural sets of storage devices include four sets of  
120 storage devices; and  
121 each set of storage devices includes three hard disk  
122 drives.  
123

- 123 16. A data storage system, comprising:  
124 a chassis having a plurality of slots substantially  
125 parallel to each other;  
126 a plurality of trays, each removably mounted on a  
127 corresponding slot of the plurality of slots in  
128 said chassis; and having a first end and a second  
129 end;  
130 a plural sets of storage devices, each set including a  
131 plurality of storage devices mounted between the  
132 first end and the second of a corresponding tray in  
133 said plurality of trays and forming an air channel  
134 with said corresponding tray; and  
135 a data access circuit coupled to said plural sets of  
136 storage devices.
- 137 17. The data storage system of claim 16, further comprising  
138 at least one fan mounted on said chassis, said at least  
139 one fan generating airflow in the air channel in each of  
140 said plurality of trays.
- 141 18. The data storage system of claim 16, each set in said  
142 plural sets of storage devices including three hard disk  
143 drives.  
144

- 144 19. The data storage system of claim 18, the plurality of  
145 slots in said chassis including a first group of slots  
146 comprised of a first, a second, a third, and a fourth  
147 slots substantially coplanar with each other.
- 148 20. The data storage system of claim 19, the plurality of  
149 slots in said chassis include a second group of slots  
150 substantially coplanar with each other and overlying the  
151 first group of slots.
- 152 21. A network server for supplying data to a client over a  
153 network, comprising:  
154 a data storage unit, said data storage unit including:  
155 a plurality of trays;  
156 a plural sets of storage devices, each set  
157 including a plurality of storage devices  
158 mounted a corresponding tray of said  
159 plurality of trays and forming an air channel  
160 with said corresponding tray; and  
161 a digital signal processing unit coupled to said data  
162 storage system, said digital signal processing unit  
163 being capable of simultaneously access multiple  
164 storage devices in said data storage unit; and  
165 a network interface coupled to said digital signal  
166 processing unit, said network interface relaying a  
167 signal transmission between said digital signal  
168 processing unit and the network.
- 169 22. The network server of claim 21, said data storage unit  
170 further including a board having a plurality of slots

171 substantially parallel to each other, wherein said  
172 plurality of trays are removably mounted in the plurality  
173 of slots in said board.

174 23. The network server of claim 22, wherein:  
175 said plurality of trays include four trays; and  
176 said plural sets of storage devices include twelve hard  
177 disk drives divided into four sets.

178 24. The network server of claim 22, further comprising an  
179 airflow generator mounted on said board, said airflow  
180 generator generating an airflow in the air channel in  
181 each of said plurality of trays in the plurality of slots  
182 in said board.

183 25. The network server of claim 24, said data storage unit  
184 further including a power supply circuit coupled to said  
185 plural sets of storage devices and mounted on said board,  
186 wherein said airflow generator further generating airflow  
187 through said power supply circuit.  
188



- 188 26. The network server of claim 21, said data storage unit  
189 further including a plurality of boards, each having a  
190 plurality of slots, wherein said plurality of trays are  
191 arranged in a plurality of groups, each group being  
192 removably mounted in the plurality of slots in a  
193 corresponding board of said plurality of boards.
- 194 27. The network server of claim 26, further comprising a  
195 mounting rack, wherein said plurality of boards are  
196 mounted on said mounting rack substantially overlying  
197 each other.
- 198 28. The network server of claim 27, wherein:  
199 each board of said plurality of boards having four slots  
200 substantially parallel to each other; and  
201 each set of said plural sets of storage devices includes  
202 three hard disk drives.
- 203 29. The network server of claim 21, said digital signal  
204 processing unit simultaneously accessing multiple storage  
205 devices in said plural sets of storage devices in said  
206 data storage unit.
- 207 30. The network server of claim 29, said digital signal  
208 processing unit accessing data in said data storage unit  
209 to supply digital video program data to a plurality of  
210 clients through said network interface over the network.